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### Strategic decision making

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# STRATEGIC DECISION MAKING

Frans N. Stokman, Marcel A.L.M. van Assen,  
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## ABSTRACT

This paper introduces a methodology for strategic intervention in collective decision making. The methodology is based on (1) a decomposition of the problem into a few main controversial issues, (2) systematic interviews of subject area specialists to obtain a specification of the decision setting, consisting of a list of stakeholders with their capabilities, positions, and salience on each of the issues; (3) computer simulation. The computer simulation models incorporate only the main processes through which differences in positions and salience are accommodated in binding decisions: management of meaning through the provision of convincing information, challenges, and exchanges. The methodology generates insights into the likely outcomes of the process, the amount of conflict involved, and the stability of the outcomes. These insights and the investigation of the effects of strategic moves provide major strategic advantages to the user. This is likely to lead to a better representation of the user's own position in the decision outcome and the creation of a broader political and social support behind the decision outcome.

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## INTRODUCTION<sup>1</sup>

Collective decision making is one of the most fundamental processes in society. People's long-term common interests often require binding decisions for their successful accomplishment. Whenever all people strive toward the same outcome there is no problem. They can simply turn the preferred outcome into a decision and act accordingly. Collective decision making becomes difficult when stakeholders take different positions and express different preferences with respect to the outcome. Then, the different positions have to be accommodated in one way or the other. The dynamics in the decision-making process result from the fact that each stakeholder, with different intensity and potential, attempts to realize his<sup>2</sup> position whereas only one outcome can be chosen.

Small informal groups can often make decisions on the basis of informal rules and agreements. As soon as common interests become more complex and groups larger, collective decision making has to be institutionalized through the elaboration of generally accepted decision-making procedures. Such formal procedures can be found at all levels of society. They specify, among other things, which bodies have the authority to make the final decisions, how these bodies are composed and their members selected, and which stakeholders at what moment have to be heard or are otherwise involved in the decision making. In addition, rules specify procedures for appeal against decisions that are harmful or not made according the required procedures.

In the social sciences, models for collective decision making have been developed since the early eighties that provide far-reaching insights into collective decision-making situations (among others, Bueno de Mesquita et al. 1985; Coleman 1990; Laumann et al. 1987; Stokman and Van den Bos 1992; Stokman and Van Oosten 1994; Torenvlied 1996; König 1997; Pappi and Henning 1998). Game theoretical insights are combined with mathematical models and computer simulation to model essential collective decision-making processes. The models represent three processes that precede formal decision making and that affect the final positions of the stakeholders involved. First, position changes are sometimes induced because stakeholders receive or provide new convincing information rather to take other positions (*management of meaning*). Second, in other situations stakeholders feel *challenged* by others to change their positions because the losses incurred by losing such a challenge are larger than the losses incurred by defending their position. Finally, stakeholders may change their positions when they see possibilities to create win-win situations through *exchanging* (logrolling).

All models require a limited set of data obtained through interviews with subject area specialists. The models generate information on the outcome, the type of process, and the amount of conflict to be expected. The aim of the models is two-fold. First, the models are used for the analysis of decision-making processes and for the prediction of decision outcomes without intervention. On the basis of a



large number of evaluation studies of mostly political decisions at the international, national, and local level (Bueno de Mesquita and Stokman 1994; Ray and Russett 1996; Stokman and Berveling 1998; Rojer 1999; Payne 1999), it can be concluded that the models are quite accurate.<sup>3</sup> Second, the models are particularly useful for intervention in decision making in order to optimize the utility of one stakeholder, to create sufficient support for a decision, or to arrive at a fair decision on the basis of mediation. These strategically oriented applications are mainly applications for large organizations and governmental agencies. They prove the usefulness of the models for obtaining direct strategic insights and for intervention in ongoing decision-making processes.

The models depart from a systematic analysis of the decision-making situation which is useful in itself. Such a systematic approach involves at first a decomposition of the problem resulting in the specification of a limited number of main controversial issues to be solved. Subsequently, an analysis of all stakeholders is required, including an overview of their positions, capabilities, and salience on each of the issues. Next, different strategies have to be considered. Computer simulation models are particularly useful for evaluating these strategies. We will elaborate each of these elements.

## THE DECOMPOSITION OF THE PROBLEM INTO CONTROVERSIAL ISSUES

The first essential step in a strategic decision-making analysis is the specification of the problem at stake in terms of a limited number of issues on which decisions have to be made. Each issue can be seen as a major controversial point for decision. Decisions of the stakeholders on the specified set of issues should determine the contours of the chosen solution. Usually, one to five issues are sufficient, even in complicated situations, but incidentally up to 20 issues have been used in some applications. The requirement of the specification of a *limited* number of issues is in its own right a good exercise to distinguish main from subordinate points. Ill-defined specification at this stage implies a possible solution to something that has little impact on the actual problem. Misspecification of the issues is the main cause of the failures in model predictions.

An important aid in the specification of issues is the requirement that at least the two extreme positions on each issue should be identified. Identification of the two extreme positions actually implies that an issue can be seen as unidimensional, a straight line on which different positions can be located.<sup>4</sup> Intermediate positions indicate more moderate positions, but also possible compromise outcomes. If extreme and possible intermediate positions cannot be ordered, the specification of the issues is wrong, for example, because more underlying issues are involved. In such cases it is recommended to go one step deeper and to identify the underlying dimensions.



If we, for example, aim to analyze the merger of two companies, typical issues are the premium to be paid for the other company above the market or shares value, the desired degree of integration of the two companies, the initial number of representatives of each company in the integrated board, the timing of the merger, and which of the two presidents will be nominated as the president of the merged company. The last issue is an example of a dichotomous issue without intermediate outcomes. Often, such issues are most difficult to solve, as no compromises are possible. Whenever possible, it is therefore advisable to integrate such issues with other issues, facilitating, for example, a solution through an exchange with other issues (e.g., the initial number of representatives in the board).

A decomposition of the problem also implies at least a provisional specification of the main stakeholders. Without such a specification it will be difficult to specify extreme and intermediate positions. Stakeholders can be individuals or organizations. Individuals usually represent organizations or hold important positions in organizations.

## CAPABILITIES, POSITIONS, AND SALIENCE

After specifying the issues, the stakeholders, and the different possible positions on the issues, the next step in a strategic decision analysis consists of the specification of three characteristics of each stakeholder in relation to each issue. These data are usually obtained in interviews with one or two experts who make estimates relating to all stakeholders. The experts should have a good overview of the whole decision-making setting. Numerical specifications are required in the models.

An example of such a numerical specification is given in Table 1. The example originates in a project carried out by a transition manager from the Dutch company W&S Transition and Interim Management. W&S was asked to reorganize a company in the Amsterdam harbor that was facing serious economic problems. The company, given the acronym ABC, had a strong ideological orientation and had to accept more projects on economic grounds in order to survive. Maintaining the present ideological orientation was highly controversial. Some stakeholders wanted it to be reduced, whereas others wanted its continuation or even strengthening. We specified the central issue of the ideological orientation as the percentage of projects that the company would be allowed to accept on ideological grounds after the reorganization.

The second column of Table 1 gives the *positions* of the stakeholders on the issue. The range is between 0 percent for competitors to 100 percent for the trade unions. The transition manager, the chairman of the supervisory board, and the economically oriented faction in the board took the rather radical position of 10 percent. Several other intermediate positions were also taken.

**Table 1.** Example of a Specification of an Issue and the Capabilities, Positions and Saliences of the Stakeholders

Capabilities	Issue: Ideological Orientation		
	Position	Saliency	
0.15	70	0.2	Ideological faction in the Supervisory Board
0.15	10	0.3	Economically oriented faction in the Supervisory Board
0.30	40	0.3	Managing director
0.30	80	0.4	Deputy director
0.15	80	0.2	Administrator
0.15	90	0.3	Project leaders
0.30	30	0.3	Managers of commercially oriented departments
0.20	70	0.4	Managers of ideologically oriented departments
0.70	100	0.1	Trade unions
0.40	80	0.1	Municipality of Amsterdam
0.60	50	0.4	Employee Board
0.80	10	0.9	Transition manager
0.10	50	0.2	Accountant
1.00	10	0.9	Chairman of the Supervisory Board
0.10	0	0.2	Competitors

**Note:** Position: Percentage of projects with an ideological orientation.

The interests of the stakeholders are not only represented in the positions they take, but also in the degree to which they are interested in the issue. We denote this as the *saliency* of the issue for the stakeholder. The saliency indicates the willingness of the stakeholder to push his position in the decision making. If the issue is hardly related to essential interests of a stakeholder, he will hardly fight for an outcome close to his position and he is to be expected to compromise quickly. If the issues are related closely to his main interests, a stakeholder will put all available clout behind his position and he is unlikely to compromise quickly. In the table, saliency is scored on a scale from 0 (not related to own interests) to 1 (the stakeholder is willing to go to the limit). The transition manager was hired to transform the company into an economically viable one. As the success of his task depended strongly on his success on this issue, the issue was very salient to him. In other words, he had a strong interest in the outcome. The chairman of the supervisory board hired the transition manager and had committed himself to make the company economically viable. For him too, success on this issue was highly important. Failing would probably have cost him his chairmanship. The other stakeholders took other positions but were also less committed to them.

In the literature and in practice it is often forgotten that the *combination* of position and saliency determines the behavior of stakeholders. These combinations are generated by the incentive structures of stakeholders. If one of the two is overlooked (in practice often saliency), serious miscalculations are inevitable.

The third element is the *capabilities* of the stakeholders to co-determine the outcome. This refers to a potential, not the actual mobilization of the capabilities.



Formal discretionary or voting power is an important capability to co-determine the outcome of decisions. Nevertheless, people with the authority to make the final decision do not do so in isolation without taking into consideration the interests of the other stakeholders. If they were to neglect the interests of others, their decisions would quickly provoke societal and political opposition, resulting in the undermining of their own authority and legitimacy. Apart from that, most decision makers lack the required expertise to decide themselves and have to rely heavily on experts and advisors who are often strongly committed themselves. In addition, decision makers often need the cooperation of others for the implementation of their decisions, for example for the required financial resources or for loyal implementation. Other capabilities, therefore, result from exclusive expertise and information, financial resources or the capability to mobilize a large number of people. Scaling capabilities therefore requires the addition of things that are difficult to compare. Nevertheless, experts are often able to provide such a scale. During the extraction procedure, a "1" is often assigned to the stakeholder with the largest capabilities. Subsequently, the capabilities of the others are related to the one with the highest capabilities and to the capabilities of each other. Additivity is assumed here. If, for example, two stakeholders form a coalition against a third, their joint capabilities are compared with those of the third to determine which of them is stronger. When a subject area specialist tries to construct such a scale, it is important to make many such comparisons, that is, to compare many opposing coalitions of different compositions and sizes.

Capabilities and salience together determine the *effective power* of stakeholders. Salience can be interpreted as the fraction of capabilities that a stakeholder is

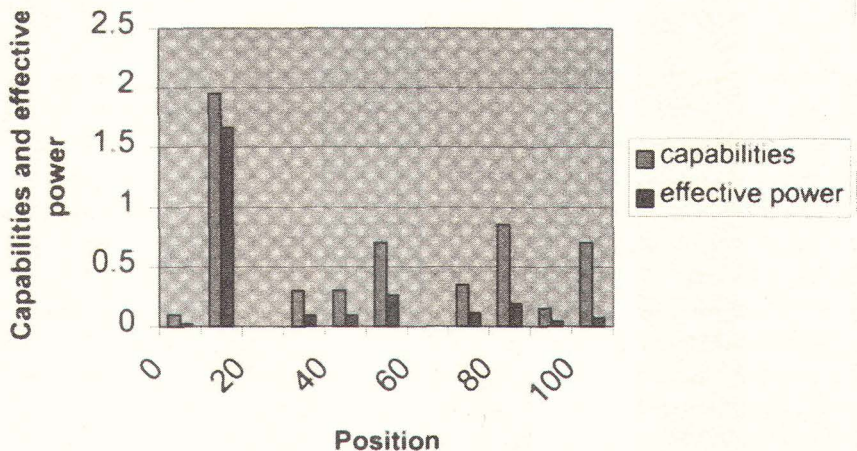


Figure 1. Capabilities and Effective Power on the Position Scale



willing to mobilize to effectuate his position in the outcome of the decision. A graphic showing the distribution of capabilities and effective power over the positions often generates much insight in the decision-making setting. Figure 1 contains an example of such a graphic for the data in Table 1. Two aspects become clear immediately: a large amount of capabilities was concentrated behind the 10 percent position and almost all of that potential was mobilized. The latter was not true on the other side of the continuum. There, only a small fraction of the capabilities was mobilized. This immediately leads to the conclusion that the transition manager (who had the position of 10 percent) had to avoid a strongly confrontational strategy because this would have had the danger of mobilizing a countervailing power. If that had happened in this example, it would also have resulted in a bipolar distribution of effective power over the continuum. Such issues are often difficult to resolve in contrast to issues where the power distribution is unimodal.

## PROCESSES AND STRATEGIES

The dynamics of decision making result mainly from the efforts of stakeholders to realize an outcome of the decision that is as close as possible to their own position. The first and most obvious target for these efforts are the positions of the other stakeholders: is it possible to move their positions toward one's own, thus building an effective coalition behind one's own position? Building such a coalition makes it more likely that final decision makers will shift their positions, resulting in a decision closer to one's own position. A characteristic of collective decision-making processes is that not only one stakeholder attempts to build support for his own position, but that they all do, thus provoking countervailing forces with the possibility that the coalition behind one's own position is not strengthened but weakened. An analysis of a particular strategy might even result in the insight that one's own position cannot be maintained whereas the aim was to build a strong coalition behind it.

There are three main processes through which a stakeholder changes his position: he receives convincing information implying that another position reflects his incentive structure better (*management of meaning*); he feels more or less forced to change his position because others *challenge* his position; or he is prepared to take another position in *exchange* for a favorable (for him) move by another stakeholder on another issue. In management of meaning and challenge processes, in principle at least, only one issue is involved, whereas in exchange more issues are always involved. We therefore consider management of meaning and challenge processes first. The three processes are also points of departure for individual strategies and we will therefore also consider them from this perspective in the next sections.

### Management of Meaning Processes and Strategies

In management of meaning processes convincing information plays a dominant role (Weick 1979; O'Reilly 1983; Bouwen 1993). As stated above, the position and salience of a stakeholder are connected to his incentive structure. The more directly an issue is connected to the central higher ordered objectives of a stakeholder and the more an issue is seen as an important condition for their realization, the more salient the issue is to him. His position on the issue corresponds to the outcome of the decision that he sees as optimal for the realization of his objectives. It does not matter what his higher ordered objectives are or where they come from. They may be related to the goals of the organization he represents or they may be related to his personal goals, such as status and behavioral confirmation, or to a combination of these. His own perception of the salience of the issue and the best outcome (position) in terms of these higher ordered objectives is essential. New information can drastically change this perception of salience and best position only if the new information is seen as reliable and is accepted as relevant. Two conditions substantially increase the likelihood that this will happen and, consequently, determine the success of convincing information strategies.

First, convincing new information is generally more easily accepted in earlier stages of the decision making than in the later ones. During the decision-making process, positions taken by the stakeholders tend to freeze. In the beginning, stakeholders often do not have very crystallized ideas about the connection between the issue and their objectives. They are relatively open to information that clarifies that connection.

Second, a substantial amount of trust in the provider of the information increases the likelihood that information is accepted as relevant and reliable. Trust will be greater if the provider has proven to be reliable in the past and if the provider can be expected to experience future negative consequences of providing distorted or incomplete information. This "shadow of the future" (Axelrod 1984) is more effective if the provider of distorted information loses his reputation not only with respect to the recipient stakeholder but also with respect to others (Raub and Weesie 1990; Buskens 1999). Trust will also be greater if the information is less related to central interests of the provider. These conditions for trust emerge more readily among like-minded stakeholders and among stakeholders who also meet each other in other contexts, than among stakeholders with conflicting interests. Stakeholders also tend to assign more weight to the opinion of powerful stakeholders, whereas powerful stakeholders tend to listen more to one another than to less powerful ones (Molm 1997; Stokman and Zeggelink 1996).<sup>5</sup> In general, convincing information strategies do not work well or sufficiently in relation to strongly polarized issues (see Figure 1) and in situations with huge power differences. Misuse of trust strongly reduces the effectiveness of convincing information strategies in the future. In decision-making processes this should not only be a guideline for one's own behavior, but can be made unequivocally clear to



others, thus reducing their inclination to provide distorted or incomplete information.

In the context of convincing information strategies it is important to take account of the fact that people tend to be myopic in two respects. First, short-term benefits and costs weigh stronger than long-term ones, otherwise nobody would smoke, nor would obligatory retirement arrangements be necessary (Lindenberg 1998). Second, stakeholders tend to see small differences around their own position much sharper than differences among remote positions (Bauer et al. 1963). This may result in strong trust crises in one's own coalition about differences of opinion that outsiders would classify as being of minor importance.

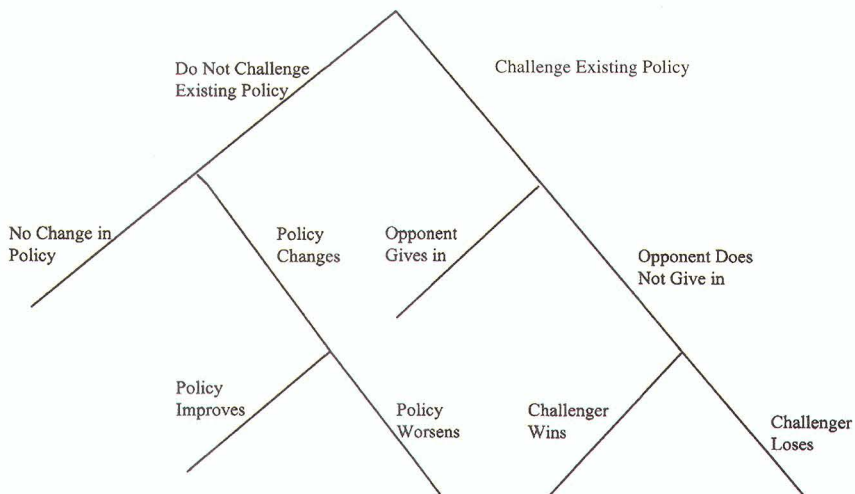
### Challenge Processes and Strategies

In challenge processes differences in power and salience play an important role. To the degree that the salience of the issue to oneself is lower and the power dominance of stakeholders who support other position is larger, one will be inclined to give up his own position. Unnecessary costs are saved by conceding a position on an issue that is only marginally related to one's own interests. In challenge processes power dominance relations are more important than arguments. The process is therefore represented in the form of a noncooperative game (Bueno de Mesquita et al. 1985; Bueno de Mesquita 1994). A challenge is more likely to be successful to the degree that the salience of the other stakeholder is lower and the support for the other's position is lower relative to the support for one's own position. In the computer simulation these two aspects dominate the determination of which stakeholder will challenge which other stakeholder (see Figure 2). Each stakeholder makes this choice in relation to each of the other stakeholders. Based on the challenges made, each stakeholder has a set of cards in his hands that represent the challenges made and received. If he received challenges, he has to draw the one that is best for him. The result is either conflict (if he made a challenge to the other as well) or a forced position change. These position changes create a new decision-making setting (iteration in the computer simulation model). In that new setting the stakeholders repeat the choice process. This continues until none of the stakeholders move anymore (substantially) or until all stakeholders take the same position. The latter does not occur often but it does in the example of Table 1. Table 2 shows how the decision making evolves on the issue of the ideological orientation of the company. The first column gives the original positions of the stakeholders as the subject area specialist provided them (see Table 1). The second column shows that (in the computer simulation) some stakeholders had to adapt their position because of the challenges obtained. Almost all movements are in the direction of the 10 percent position. After the first round or iteration the support for that position increases substantially, resulting in a still stronger movement in that direction. In iteration four all stakeholders take that position. In reality,



consensus emerged around that position, notwithstanding the very controversial nature of the issue at the beginning.

For challenge strategies to be successful at least three elements have to be considered explicitly. The first involves the choice of one's own position at the beginning of the decision-making process. Will a more extreme position result in a better outcome (closer to one's own position or an outcome with a larger amount of political and social support) or is it better to choose for a more moderate position? The same holds for the leverage a stakeholder shows to others.<sup>6</sup> Is it better to push with all available clout or will a less involved stance to better results? If decision-making processes were to evolve monotonically, a more extreme position and a higher leverage would always lead to a better result, but this is not the case. The main reason is that individuals behave differently in loss situations than in gain situations, both in individual decision making (e.g., Kahneman and Tversky 1979) and in collective action in social dilemma situations (Raub and Snijders 1997; Van Assen 1998). In loss situations individuals are more willing to accept risks, whereas they tend to be more risk averse in gain situations. If a stakeholder confronts his adversaries with a strong loss situation by taking an extreme position and showing a high leverage, his adversaries tend to become more risk seeking and resisting. The consequence may well be that he loses support for his position and that he has to accept a worse outcome. These effects are also incorporated in the simulation model and can be evaluated systematically. If, for example, the transition manager in the example of Table 1 had chosen for the position



Source: Bueno de Mesquita et al. 1985

**Figure 2.** The Challenge Process

**Table 2.** Example of Evolution of Challenge Process (Computer Simulation)

<i>Positions in iterations</i>					
<i>Initial</i>	<i>Iteration 1</i>	<i>Iteration 2</i>	<i>Iteration 3</i>	<i>Iteration 4</i>	
70	10	10	10	10	Ideological faction in the Supervisory Board
10	16	10	10	10	Economically oriented faction Supervisory Board
40	10	10	10	10	Managing director
80	80	10	10	10	Deputy director
80	35	10	10	10	Administrator
90	90	77	10	10	Project leaders
30	10	10	10	10	Managers of commercially oriented depts.
70	70	10	10	10	Managers of ideologically oriented depts.
100	100	100	40	12	Trade unions
80	35	10	10	10	Municipality of Amsterdam
50	10	10	10	10	Employee Board
10	10	10	10	10	Transition manager
50	10	10	10	10	Accountant
10	10	10	10	10	Chairman of the Supervisory Board
0	2	10	10	10	Competitors

of 0 percent, the predicted outcome would still be 10 percent. However, unanimity would then only have been reached after six iterations with a larger amount of conflict. This would have also resulted in a lower prestige for the transition manager, as the computer simulation shows he would have had to move from 0 to 10 percent in the fifth iteration.

In addition to an explicit reflection on one's own position and leverage, an explicit evaluation of the likelihood of success of challenges is recommended. If a stakeholder takes an extreme minority position, his own chances of successful challenges are likely underestimated (resulting in no or less challenges) for the same reason as above: there is a tendency to overestimate the risks stakeholders close to the expected outcome are likely to take. As they are in a gain situation, stakeholders with positions close to the expected outcome are reluctant to make challenges and are an easier target than stakeholders with extreme minority positions expect. The simulation model provides insight into such likely misperceptions of stakeholders and their effect on the outcome of the decision. Repeatedly, these misperceptions have been shown to exist in reality and their analysis has increased success rates considerably (Ray and Russett 1996).

### Exchange Processes and Strategies

In exchange processes contrasting interests play a dominant role. Contrasting interests manifest themselves in a combination of fundamental differences in positions and salience over different issues. Whereas management of meaning

**Table 3.** Position Exchange Possibilities

		Issue 2	
		Left	Right
Issue 1	Left	A	B
	Right	C	D

strategies are effective among like-minded stakeholders, exchanges of positions are most profitable between stakeholders who have (1) opposing positions on the issues and (2) very different patterns of salience. The latter means that one stakeholder is mainly interested in one issue, whereas the other issue is strongly related to higher objectives of the other stakeholder. The result of a position exchange between two stakeholders is that they shift their voting position in the direction of the other on the issue that is relatively more salient for the other. In this way they create a win-win situation.

Table 3 describes exchange possibilities in terms of positions held by the stakeholders. Exchange possibilities exist between stakeholders who hold opposing positions on both issues, that is, are located at different sides of the expected outcome on both issues. From this perspective we distinguish four groups of stakeholders. Stakeholders in group A are located on the left side of the expected outcome on both issues, stakeholders in group D on the right side. They have opposing interests on both issues and are therefore important potential exchange partners. The same holds for the groups B and C. As A and B have the same position on the first issue, they cannot exchange. A and C cannot exchange as they have the same position on the second issue. Similar arguments hold for the groups C and D, and B and D.

Stakeholders from two groups with opposing positions can profit from position exchange if the relative salience of the two issues for each of them is different (Stokman and Van Oosten 1994).<sup>7</sup> A position exchange is then profitable for both, but has also important side effects for others. This can be seen clearly in Figure 3. Assume a stakeholder from group D attaches relatively more salience to issue 1 than to issue 2 if we compare his saliences with those of a stakeholder in group A. Then issue 1 is D's demand issue and A's supply issue. Position exchange between A and D implies that A is willing to shift his position on issue 1 in the direction of D, whereas D does the same on issue 2. If they do, they both shift away from B in the direction of C on both issues. B is thus punished doubly and C rewarded doubly, while none of the two is engaged in the exchange. If issue 1 would have been A's demand issue, C would have been punished twice and B rewarded twice.



Exchanges can also be threatening for internal group cohesion. Threats emerge when stakeholders in a group differ in their prioritization of the issues. We consider again two potential exchange groups, for example A and D. Assume that there are two stakeholders in group A,  $A_1$  and  $A_2$  (see Figure 4). Assume also that the salience of issue 2 for  $A_1$  relative to issue 1 is higher than that for the stakeholders in group D, while the reverse is true for  $A_2$ . Then D can split group A. For  $A_1$ , issue 1 is the supply issue on which he is prepared to shift his position in the direction of D. In contrast,  $A_2$  wants to maintain his position on issue 1 and is prepared to shift his position on issue 2 in the direction of D. If D were to exchange with both, the effect would be that D shifts on both issues in the direction of A, and that  $A_1$  and  $A_2$  differ in their positions on both issues (see Figure 4). It can be shown that D creates a prisoner's dilemma for  $A_1$  and  $A_2$  where both  $A_1$  and  $A_2$  are better off not exchanging at all (Van Assen et al. forthcoming).

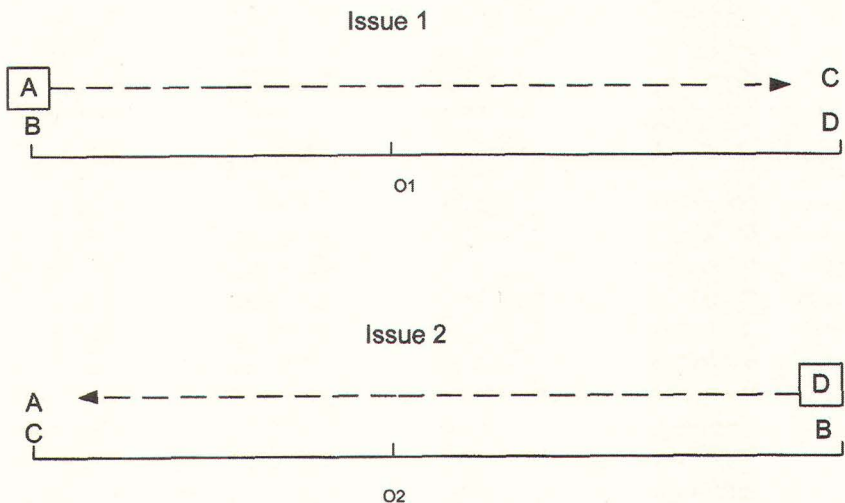
The representation of exchanges used in our models is fundamentally different from the representation used in most social exchange theory literature. The representation of exchanges we use is similar to that used by Coleman (e.g., 1972, 1990) who also represents both actors' interests in goods and the goods actors possess. In network exchange theory the division of a common resource pool (e.g., Bienenstock and Bonacich 1992; Cook and Yamagishi 1992; Friedkin 1992; Markovsky, Willer, and Patton 1988; Skvoretz and Willer 1993) is used to represent exchanges. Van Assen (forthcoming) demonstrates that the often-used division of a common resource pool is generally not a theoretically valid representation of exchanges.

All solutions proposed for the exchange rate in the literature can be applied to both our representation and the representation in terms of the division of a common resource pool. Stokman and Van Oosten (1994) use an equal utility gain for both exchange partners. This has the advantage that exchanges have the same utility for both partners and can be handled in order of attractiveness to both. The disadvantage is that it involves an intersubjective comparison of utility, which is theoretically unattractive. For our representation of exchanges two solutions of the exchange rate have been derived that are independent of the utility scale: the Nash solution (Achterkamp 1999; Van Assen forthcoming), and the Raiffa-Kalai-Smorodinsky (RKS) solution (Van Assen forthcoming). There is a strong link between our work and network exchange theory because exchange-resistance solution used in network exchange theory (e.g., Willer, Markovsky, and Patton 1988; Skvoretz and Willer 1993; Willer and Szmataka 1995) is also derived from the game theoretical RKS solution (Heckathorn 1980). Van Oosten (forthcoming) bases the exchange rate on satisficing adaptation of random rates.

A difference between our work and work in network exchange theory is that the latter until now only deals with exchanges of private goods. This is also the starting point for Coleman's models and his generalizations to public goods are not straightforward (Stokman and Van Oosten 1994). We, however, investigate

exchanges of voting positions with externalities for other actors. A change in voting position affects all stakeholders in collective decision making. Interestingly, network effects on exchanges and their rates in social exchange theory are completely different from these effects in exchanges of goods with externalities to other actors (Van Assen et al. forthcoming).

In exchange processes, three elements have to be considered explicitly when formulating one's own stance. The first concerns the selection of the issues one wants to include in the exchange process. Of course, one cannot always determine this alone, but there are many situations in which this is possible, for example, through the order in which different issues are negotiated. The second is the change one incorporates deliberately into one's own positions. Change will in general be incorporated in the less salient issues and is designed to facilitate concessions during an exchange. One should of course realize that extreme positions could provoke extremity on the other side, which easily nullifies the positive effect by resulting in more conflict and tension. The third element concerns one's prioritization of the issues, the distribution of the leverage over the issues that one shows. Here too a certain balance is needed. If one shows too much leverage on highly salient issues, one has to give in a lot on the other issues to obtain a position shift by the other stakeholders (it is generally known that in social relations, the person most interested in the relation tends to be exploited (Blau 1964)). If one does not show enough leverage on highly salient issues, one's own position and salience may well not be discerned by others, giving them an opportunity to move



**Figure 3.** Effects of Exchanges for Third Stakeholders



After two exchanges both  $A_1$  and  $A_2$  have changed their position.

**Figure 4.** Effects of Differences in Prioritization within Groups

the issue aside and to maintain the status quo. If one shows too quickly that one is not really interested in less salient issues, the proposal to shift one's own position on these issues may well not be seen as a serious concession that justifies a move on another issue by the other stakeholder.

#### An Example of a Combined Strategy

Table 4 contains an example of how different strategies can be combined to determine which issues should be included in the exchange process in order to obtain an optimal outcome. The example is derived from an application in the context of Dutch labor negotiations. The main issue concerned a fundamental change in social benefit rights. The data were collected just before the start of the negotiations. In the row "Position" the positions of the client at the start of the negotiations are given. The client aimed at an obligatory start of the new system for all employees younger than a certain age (position 100). The other stakeholders aimed at an obligatory start only for new employees (position 70) or no new system at all (position 0; status quo). The positions 70 or 0 would imply considerable delay or no change at all. A second important issue in the new regulation concerned a certain degree of freedom for the employees to adapt the new system to their own wishes (in Table 4 denoted "Introduction of Choice Elements"). The client was for a large amount of freedom (position 100), while the other parties



**Table 4.** Effects of Different Strategies in Labor Negotiations

<i>Position</i>	<i>Main Issue 100</i>	<i>Guarantee 60</i>	<i>Exchange Issue 50</i>	<i>Alternative Exchange Issue 0</i>	<i>Introduction Of Choice Elements 100</i>
Outcome before					
Exchange, No Optimization	40	75	70	100	70
Challenge at Main					
Issue, Rest through Exchange	<b>70</b>	70,75	70	50	70,100
Best Exchange on					
First Three Issues	100	63,75	70	Excluded	<b>100</b>
Exchange without					
Alternative Exchange Issue	100	68,75	70	Excluded	81,100
Exchange without Choice	100	70,75	70	40	<b>100</b>
All Issues Included in Exchange	100	70,75	70	40	86

**Notes:** **Bold:** Not included in exchange solution.

*Italics:* Acceptance by unanimity.

Normal: majority, including the largest stakeholder.

Double number: Majority for first, excluding the largest stakeholder.

wanted the freedom to be limited strongly (position 0). A third important issue concerned guarantees for a minimum level of the benefits (the higher the position, the higher the guarantee). A fourth issue concerned the level of another social benefit, in the table denoted "Exchange Issue." The client introduced this issue explicitly as his supply issue and chose to adopt a low position initially that could be changed during the negotiations. An external advisor from an organization with a much experience in this subject area advised to include another issue in the exchange process, denoted "Alternative Exchange Issue" in Table 4. This would have been very risky, as any concession on this issue would have been very expensive for the client. Moreover, the issue is normally dealt with in another negotiation context. The client's position was 0 (no change) against position 100 supported by all other stakeholders (resulting in extra benefits). The client aimed at an outcome of the negotiation process that was not only close to his positions but was broadly supported as well.

The row "Outcome Before Exchange, No Optimization" contains the outcomes predicted by the computer simulations when all issues are dealt with in isolation. These are the predicted outcomes on the basis of the aforementioned challenge strategy. They are obtained in different iterations without optimization aiming at outcomes closer to the positions of the client or at broader support. The predicted outcome on the main issue implies no change in the system or only in the long run. The outcomes on the other issues are also far from the preferred positions of the client. Under this scenario, the best course of action for the client would be to call a halt to the decision-making process immediately.

The row "Challenge at Main Issue, Rest through Exchange" gives the outcomes with an optimal challenge strategy on the main issue combined with an exchange process over all remaining issues. With optimization we were able to arrive at a computer prediction of 70 for the main issue, corresponding to implementation for all new employees. The optimization consisted of a carefully selected leverage the client should show in combination with certain challenges the client would likely miss (and were indeed surprising for him). The exchange outcomes on the other four issues are not very promising. None of the predictions corresponds with his position. He has to give up a lot on the other issues in return for a better result on the Alternative Exchange Issue that has a high salience for him because of the large costs involved. Even then, he has to make a huge concession on that issue.

The next row, "Best Exchange on First Three Issues," shows the results of a strategy that produces broadly supported outcomes close to the positions of the client. In this solution the Alternative Exchange Issue is entirely left out of the decision-making process. In isolation from the other issues, the issue cannot be solved. The best solution would be to exclude the issue entirely from the decision making. The main argument for its exclusion is the other negotiation platform to which it belongs. Our analysis therefore showed that the advice of the external advisor to include this issue was really very disadvantageous for the client. We advised that the decision on the issue Choice Elements should be made after negotiations on the first three issues had taken place. Choice Elements is the only non-financial issue. Moreover, the outcomes on the first three issues have to be known before one can make sensible decisions on this issue. Using an optimized challenge strategy the issue could be resolved according to the position of the client. By using an exchange strategy, broadly supported outcomes close to the positions of the client were obtained on the first three issues.

In the last rows of the table the results are shown of alternative strategies in which more issues are included in the exchange. All these strategies produce worse results than the strategy "Best Exchange on First Three Issues." Therefore, we recommended that strategy and the client implemented it successfully. This example demonstrates the power and fruitfulness of our approach.

## CHANGING THE DECISION SETTING

The management of meaning, challenge, and exchange strategies take a decision setting as given. The setting corresponds to the specification of the issue(s) and the stakeholders with their capabilities, positions, and salience. If none of the strategies is effective and the issues are essential to obtain higher ordered objectives, a stakeholder can deliberate on whether the setting itself could be changed for better goal attainment. Stakeholders are inclined to pose this question more forcefully when they, time and time again, do not succeed in obtaining their objectives or when the decision-making process is blocked repeatedly by funda-



mental controversies. The approach presented above focuses directly on how to realize such a change in the decision setting.

As the stakeholders with their power, positions, and salience determine the decision-making setting, strategies to change the decision setting can best be evaluated on their likely effects on the distribution of these three variables.

The combination of position and salience of the stakeholders is connected with the incentive structures of the stakeholders. Changing the incentive structures is consequently the most important point of departure to obtaining fundamental changes in position and salience of certain stakeholders. Assume, for example, that the cooperation of farmers is essential for the success of an environmental policy concerning the disposal of manure, and that they are not prepared to cooperate freely or to accept certain policy measures. Their position and salience can then be influenced by a tax system that shifts their short-term economic interests in the direction of a more environment-friendly way of farming. This will lead to another stance of the farmers on issues related to manure policy (Baarda 1999).

An important part of the power distribution between stakeholders is related to institutional arrangements. Long-lasting deprivation of certain stakeholders often results in a demand for institutional change, for example, through changes in the composition of bodies and advisory committees, changes in competencies between bodies, extension or reduction of possibilities for appeal. Changes in institutional arrangements and customs are therefore the most important ways to change the power distribution among stakeholders. In addition, other, more informal capabilities can be increased or diminished. One can think of alliances, take-overs, or even mergers that can shift the power balance considerably.

## CONCLUSIONS

We have demonstrated that far-reaching insights into the decision-making process can be obtained from a correct problem decomposition, a decomposition resulting in a few main controversial issues, and a proper specification of the decision setting (stakeholders with their capabilities, positions, and salience). These insights concern the processes and the likely outcomes of the process, but also the amount of conflict involved and the stability of the outcomes. These insights are obtained by combining a systematic decomposition of the problem into main issues with systematic interviews of subject area specialists and computer simulation. In these computer simulation models not all aspects of the decision-making process are represented, but only the main processes through which differences in positions and saliences are accommodated in binding decisions. In our view, three main processes are at stake: management of meaning through the provision of convincing information, challenges, and exchanges. In the provision of convincing information, trust and credibility play a dominant role. These conditions prevail among stakeholders with rather similar positions, between stakeholders with bridgeable

power differences, and in situations where the positions are not yet fixed and still have to be formed. In contrast, in challenge strategies stakeholders purposively exploit power differences to build coalitions. In exchange processes large differences in interests prevail, not only in terms of extreme opposing positions but also in terms of the priority rankings of the issues.

Important strategic advantages can be gained from the insights generated by such an analysis. They can be used to obtain a better representation of one's own position in the decision outcome, and also to broaden the political and social support behind the decision outcome. With respect to challenge strategies, the effects of increasing or reducing leverage and of taking a more extreme or moderate position can be investigated. Moreover, warnings against often occurring misperceptions are generated, misperceptions resulting from differences between stakeholders' attitudes toward risks that are often neglected. For exchange strategies, the effects of linking or excluding issues, of differences in prioritization, and of built-in change can be investigated. These are fundamental new insights in collective decision-making processes that have been generated by the social sciences since the beginning of the eighties. This has resulted in a shift of attention from questions about power differences to differences in the effects of power differences. These effects are context dependent. It is the combination of the power distribution over positions and the differences in leverage of the stakeholders that co-determines the setting. It is this combination that conditions the effects of power differences (Mokken et al. 1998).

The approach presented above has passed the experimental phase. The team of scholars around Bueno de Mesquita and the Dutch group analyzed more than 6,000 issues. In the United States the first applications were related to American foreign policy, but gradually the emphasis has switched toward business applications. In the Netherlands the method has been applied for several ministries, large municipalities, and large companies for the analysis of complicated and important issues. Time and time again the clients indicated that they obtained many new insights through the approach and that they were able to realize their objectives more than they expected to do. Many clients returned for advice on other problems.

Important scientific questions remain. Within the domain of collective decision making a further analysis of the three processes continues. The conditions under which each process is dominant is one of the main questions to be answered (see also Achterkamp 1999). This is of particular importance because some of these processes are based on cooperative strategies, whereas others are based on conflictual strategies. Under what conditions do we need to be prepared for conflict strategies and what macro effects do such conflictual strategies have? Do they result in other and worse outcomes from the perspective of social welfare? Do noncooperative strategies lead to longer and more difficult decision-making processes? Is it possible and desirable to add complexity to the models? How do these models relate to other models, such as coalition and pure game theoretic models?



From the perspective of societal relevance, the conditions for broadly supported outcomes are of central importance. The approach described above enables much more sophisticated research to be conducted on this question, thus contributing to research with a view to the enhancement of social cohesion and solidary behavior.

In addition, central questions remain concerning the relation between collective decision making and other processes. The models make intensive use of insights from game theory, social psychology, and economics. Nevertheless, further investigation of the relationship between these areas in general, and individual and collective decision making in particular could well result in important new insights. Such research could help to derive positions and salience on issues from the incentive structures of stakeholders. Research on the weight of the different power components in the overall power or capability index of a stakeholder could provide fundamental insights to be used in the design of institutional arrangements in society. All these questions belong to the central questions of the social sciences and cross several disciplinary boundaries. Answers to these questions will likely have huge societal impact and utility.

## NOTES

1. This paper is based on insights gained during the long-term development of the methodology described here, and applications of collective decision-making models. The roots of this development can be found in Mokken and Stokman (1976). Part of the methodology is based on a model developed by Bruce Bueno de Mesquita of Stanford University. The collaboration with him has been very inspiring and helped in developing our own contributions. Many insights originate from scientific applications, mainly within the context of PhD projects in the Dutch Interuniversity Research Institute and Graduate School ICS. Commercial applications of the methodology by *DECIDE* bv helped significantly in the systematic analysis and testing of the effectiveness of strategic moves. *DECIDE* bv is a company associated with the University of Groningen and the ICS. We thank Robert Thomson for correcting the English.

2. Wherever we use the male form, we also imply the female one.

3. A good illustration of the accuracy of the models was given in 1996. At the start of the labor negotiations in the Dutch metal industry (July 1996) Maurice Rojer and the first author collected data on 16 controversial issues and publicly announced that we had given our predictions in a sealed envelope to a notary. At the end of the negotiations in September we opened the envelope at a press conference. One issue was held in study. Of the other 15 issues we predicted 13 correctly according to sharp criteria (87%). Among these 13 were exact predictions of the salary increase and the changes in the retirement arrangements, two of the most controversial issues.

4. All models discussed in this paper assume that the issues are unidimensional and that the stakeholders have single-peaked preference functions.

5. In our management of meaning model, three parameters are estimated for policy networks. The first parameter is related to the overall density of influence relations, the second to the difficulty to surmount power differences in establishing influence relations, and the third to the importance of similarity of positions on issues in establishing influence relations (Van Assen and Stokman forthcoming). If no network data are available (only the capability, position, and salience scores of the stakeholders on the issues), the model can be used to estimate the network effects and the effects on the outcomes of the issues of different values of the parameters.

6. The term leverage is used to refer to the strategically chosen salience in decision-making processes. For a model that optimizes the leverage over a set of issues, see Stokman and Stokman (1995).

7. The exchange process as described and modeled is an example of a cooperative game model. The analysis of win-sets is an example of a noncooperative game through which stakeholders can create win-win situations. Win-sets are solely based on an analysis of the positions of the stakeholders. They do not take salience into account.

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